

OPENER:

Simplify:

a) $(-2x^2y^3)(4xy^5)$

$$-8x^3y^8$$

b) $-3(x^2 - 5x + 6)$

$$-3x^2 + 15x - 18$$

c) $(2x^2 + 3y - x) - (x + 4x^2)$

$$\begin{array}{r} 2x^2 + 3y - x - x - 4x^2 \\ \hline -2x^2 + 3y - 2x \end{array}$$

d) $2x(x - 3) - 4(x + 7)$

$$\begin{array}{r} 2x^2 - 6x - 4x - 28 \\ \hline 2x^2 - 10x - 28 \end{array}$$

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(3.4) Expanding Quadratic Expressions

How to EXPAND a Quadratic Equation

Recall: The **factored form** of a quadratic relation is $y = a(x - r)(x - s)$

- First we expand by multiplying each term in the first bracket by each term in the second bracket.

This is the process of multiplying 2 binomials.

We call this process **FOIL** (First, Outside, Inside, Last)

- Then we simplify by collecting like terms.
- This results in a quadratic relation in standard form.

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Multiplying Binomials Using FOIL

$$(x + 3)(x - 4) \text{ factored}$$

First Outside Inside Last

\uparrow F	\uparrow O	\uparrow I	\uparrow L
x^2	$-4x$	$+3x$	-12

$$x^2 - x - 12 \text{ standard}$$

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Final Step: Combine like terms

$$x^2 - 4x + 3x - 12$$

$$x^2 - x - 12$$

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Multiplying Binomials Using FOIL

$$(2x + 3)(3x + 5)$$

First Outside Inside Last

\uparrow F	\uparrow O	\uparrow I	\uparrow L
$6x^2$	$+10x$	$+9x$	$+15$

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Final Step: Combine like terms

$$6x^2 + 10x + 9x + 15$$

$$6x^2 + 19x + 15$$

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$$f(x) = (x+2)(x-6)$$

$$x^2 - 6x + 2x - 12$$

$$x^2 - 4x - 12$$

$$f(x) = (x+2)^2$$

$$(x+2)(x+2)$$

$$x^2 + 2x + 2x + 4$$

$$x^2 + 4x + 4$$

$$f(x) = (x-6)(x+6)$$

$$x^2 + 6x - 6x - 36$$

$$x^2 - 36$$

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Example 2: Change the following expressions from factored form to standard form.

a) $y = -2(x-3)(x+4)$

$$-2(x^2 + 4x - 3x - 12)$$

$$-2(x^2 + x - 12)$$

$$-2x^2 - 2x + 24$$

b) $y = 3(x-4)^2$

$$y = 3(x-4)(x-4)$$

$$= 3(x^2 - 4x - 4x + 16)$$

$$= 3x^2 - 8x + 16$$

$$= 3x^2 - 24x + 48$$

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Example 3: Find the values of a and b

$$(x+a)(x+3) = x^2 + 5x + b$$

$$5x - 3x = 2x$$

 \therefore

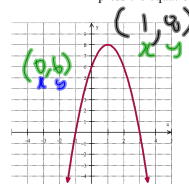
$$a = 2$$

$$(x+2)(x+3) = x^2 + 5x + 6$$

$$\therefore b = +6$$

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Example 4: Determine the equation of the parabola. Express the equation in standard form.



$$f(x) = a(x-r)(x-s)$$

$$f(x) = a(x-(-1))(x-3)$$

$$f(x) = a(x+1)(x-3)$$

$$(1, 8)$$

$$8 = a(1+1)(1-3)$$

$$8 = a(2)(-2)$$

$$8 = -4a$$

$$-2 = a$$

$$f(x) = -2(x+1)(x-3)$$

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Example 5: Write a quadratic relation in standard form for a parabola with zeros at $(-1, 0)$ and $(7, 0)$ and the point $(3, 5)$ on the graph.

Homework

Pg. 166 # 3 – 6ace, 7bdf, 8ab, 9, 10, 11a

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